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March 6, 1996

By Hand

Michele Farquhar
Chief, Wireless Telecommunications Bureau
Federal Communications Commission
2025 M Street, NW, Room 5002
Washington, DC 20554

Scott Blake Harris
Chief, International Bureau
Federal Communications Commission
2000 M Street, NW, Room 800
Washington, DC 20554

Re: 28 GHz Band Segmentation Plans
CC Docket No. 92-297

Dear Ms. Farquhar and Mr. Harris:

As a follow-up to our letter to you dated March 4, 1996, CellularVision USA, Inc. ("CellularVision"), the parent of the only commercial Local Multipoint Distribution Service ("LMDS") licensee in the United States, and the tentative awardee of a pioneer's preference for its role in developing LMDS, is writing to further respond in greater detail to the grossly inaccurate and misleading assertions of Hughes Communications Galaxy, Inc. ("Hughes") about the impact to LMDS systems of the "Option 5" band segmentation plan as set forth in Hughes' letter to you dated March 1, 1996.

Hughes' claims that "there is no cost imposed on LMDS subscriber boxes under Option 5 that is not already present under any of the other band plans. . . [and] the costs for LMDS to use non-contiguous spectrum are the same as the costs that the GSO satellites will bear to use non-contiguous spectrum" (Hughes Letter, p.1, emphasis in original) are false and reflect a fundamental misunderstanding of LMDS system design. Further, the Hughes letter suffers from a failure to disclose and consider all pertinent facts, and a reliance on issues that simply are irrelevant to the question of the impact of Option 5 on LMDS systems. As discussed below, and based upon the technical analysis of Jeffrey A. Krauss, Ph.D., and Eric N. Barnhart, P.E., contrary to the assertions of Hughes, Option 5, which would split the LMDS

spectrum into three non-contiguous bands, would impose a severe penalty on LMDS system designs that the GSO/FSS systems would not share.

(1) The "LMDS Subscriber Box Frequency Range" is Irrelevant

The LMDS subscriber equipment cost is based on two major components: (1) the antenna and downconverter assembly, and (2) the subscriber receiver. We believe that Hughes, in seeking to artificially minimize the impact of Option 5 on LMDS system design, has chosen improperly to focus on the costs of the subscriber receiver related to its input bandwidth, which is both misleading and disingenuous. CellularVision believes that the subscriber receiver costs related to "frequency range" will vary relatively little with respect to the band plan option ultimately adopted by the Commission – but only because we anticipate that simply increasing its "frequency range" is not an alternative. Notwithstanding Hughes' misplaced reliance solely on the LMDS subscriber receiver, Hughes further errs in seeking to draw comparisons to a Comstream receiver that is approximately 3½ to 5 times more expensive than the receiver currently used by CellularVision and its cable competitors.

The downconverter costs, in contrast to the subscriber receiver, may vary significantly under different band plan options, particularly if subscriber-to-hub and hub-to-subscriber communications are in subbands that are interspersed – forcing a complicated downconverter implementation approach. This is the essential, and most objectionable impact of Option 5, because Option 5 prohibits subscriber-to-hub transmissions in the 29.1-29.25 GHz band. Consequently, Hughes has chosen to focus its "analysis" only on the LMDS subscriber receiver costs which essentially are irrelevant to Option 5 since the structure of Option 5 forces a complex downconverter design. Additionally, Hughes ignores the issue of increased cost due to higher receiver complexity related to functions such as frequency conversion, demodulation and control – functions not related to the "frequency range" of the receiver.

(2) Option 5 Could Force Extensive and Expensive Modifications to Some LMDS Receiver/ Downconverter Designs

Some LMDS designs contemplate hub-to-subscriber and subscriber-to-hub transmissions in separate subbands. Because Option 5 prohibits subscriber-to-hub transmissions in the 29.1-29.25 GHz band, the logical place for return links would be the 150 MHz from 28.45 GHz to 28.6 GHz. However, since that 150 MHz is located between two subbands that may be used for hub-to-subscriber communications, Option 5 would have a severe impact on the design of LMDS downconverters in two-way LMDS systems.

Under Option 5, the potential for a single block conversion of hub-to-subscriber signals at the subscriber would be precluded – to accomplish this, the block to be converted (27.5-29.25 GHz) would necessarily include not only the subscriber-to-hub transmissions from 28.45-28.6 GHz, but also GSO/FSS, NGSO/FSS and MSS feeder uplinks. By contrast, from a system architecture standpoint, under Option 4, the return links could be placed in the 29.1-29.25 GHz band, and the single downstream block conversion could be done over the contiguous 850 MHz from 27.5-28.35 GHz. LMDS designs based on this simple approach could be attractive. Eliminating this possibility with Option 5 would represent an unjustifiably severe penalty against LMDS.

Thus, Hughes' claim that "under any of these plans [Options 1, 2, 2A, 3 and 4], LMDS faces the same frequency challenges as it would face under Option 5" (Hughes Letter, p.2) is wrong and reflects either a lack of understanding of LMDS system design and the provisions of the various band plan Options, or a disingenuous assertion intended to obfuscate relevant facts.

(3) The Costs for LMDS Systems to Use Non-Contiguous Spectrum are NOT the Same as for GSO/FSS Systems

Hughes' statement that the costs to LMDS of using non-contiguous spectrum are the same as those for GSO satellites is flatly wrong. To understand this, it is valuable to review the differences in the treatment of LMDS and GSO/FSS systems under Option 5. A fundamental difference between LMDS and GSO/FSS under Option 5 is the amount of spectrum proposed for each service, and the direct impact that has on spectrum utilization by the two services. LMDS, under Option 5, would be provided a total of 1000 MHz, separated into three non-contiguous bands spanning 1.75 GHz:

27.5-28.2 GHz (H ↔ S)
28.45-28.6 GHz (H ↔ S)
29.1-29.25 GHz (H → S)

GSO/FSS, under Option 5, would be provided a total of 1000 MHz, separated into two non-contiguous bands spanning 1.8 GHz:

28.2-28.45 GHz (Uplink)
29.25-30.0 GHz (Uplink)

At first glance, the Option 5 allocations to LMDS and GSO/FSS appear to be roughly equivalent – 1000 MHz in non-contiguous bands over slightly less than 2

GHz, as Hughes asserts. This is not the whole picture, however, as GSO/FSS also has companion downlink spectrum in the 18 GHz band which provides a minimum of another 1000 MHz for a total of 2000 MHz on a primary basis[1] - spectrum that Hughes and the GSO/FSS proponents expect to receive free, without being subject to spectrum auctions as planned for the 1 GHz LMDS allocation in the 28 GHz band. Consequently, one key difference is that LMDS must conduct its two-way operations within a total of 1000 MHz of spectrum, while GSO FSS systems may conduct two-way operations over a total of 2000 MHz of spectrum.

Moreover, the GSO/FSS downlink spectrum is removed from the uplink spectrum by about 10,000 MHz. Thus, in addition to the inherent bandwidth advantage of GSO/FSS systems, another, perhaps more significant difference is that GSO/FSS systems would have a transmit/receive separation of 10 GHz, while LMDS systems would have a transmit/receive separation under Option 5 of only 250 MHz (the difference between 28.20 and 28.45 GHz).

Beyond the gross differences in spectrum allocations for LMDS and GSO/FSS under Option 5, there are also fundamental differences between the service plans for LMDS and GSO/FSS. This can best be illustrated by comparing the Hughes Spaceway proposal with LMDS. The Hughes Spaceway application states that Spaceway would operate over spot beams using "120 MHz of bandwidth . . . [that would] cover an area approximately 400 miles in diameter."[2]

In contrast, CellularVision's commercial LMDS system currently is in service in the U.S. with an architecture that provides signals with a 1000 MHz bandwidth to every subscriber – a factor of more than eight larger than Spaceway. The fact is, Hughes need not build a transmitter or receiver for Spaceway that even approaches the bandwidth of the LMDS transmitter or receiver.

Hughes does not need to serve individual subscribers with "non-contiguous" spectrum. The Hughes system design is based on individual service bands of 120 MHz each, each of which may be shared by lower bandwidth RF carriers. The country would be covered by spot beams, so that a 120 MHz service band would be assigned to each subscriber. Any individual subscriber would be served only by a single 120 MHz service band. Thus, Hughes' subscriber terminals need not operate

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[1] Option 5 also provides GSO/FSS with a secondary allocation of an additional 1250 MHz in the 28 GHz band.

[2] Application of Hughes Communications Galaxy, Inc. for Spaceway, July 26, 1994, at p.13.

across the full 1000 MHz allocated for GSO/FSS uplinks. Instead, each terminal can be built to operate only within the 120 MHz channel assigned to the spot beam for its location. Thus, a key difference between LMDS and Hughes' proposed GSO/FSS system is that LMDS subscriber equipment will operate across the entire band allocated for LMDS, while the Hughes subscriber equipment need only operate across a 120 MHz service band. Even if Hughes elected to build a subscriber receiver to cover the entire 1.8 GHz span (under Option 5), doing so would expose the receiver to non-FSS signals within the 1.8 GHz span emanating only from sources on orbit such that the "interference" would not be problematic. LMDS would not have this luxury, as "interference" within its 1.75 GHz span would originate from earth-based sources, including GSO/FSS, NGSO/FSS and MSS feeder uplinks, as well as LMDS subscriber-to-hub transmissions in the 28.45-28.6 GHz band.

Another key difference between LMDS and the proposed GSO/FSS systems is that the subscriber receivers for the satellite system receive at 18 GHz, not at 28 GHz. The 18 GHz technology is more mature and thus relatively less expensive than 28 GHz receiving equipment.

Given these differences, it is clear that Hughes' statement that "the costs for LMDS to use non-contiguous spectrum are the same as the costs that the GSO satellites will bear to use non-contiguous spectrum" is completely without basis. Moreover, it is misleading and deceptive. Hughes, by its own admission, will not use non-contiguous spectrum to provide service to a given receiver, and the receiver will not even operate in the Ka-band. There is no similarity between LMDS and Hughes' proposed GSO/FSS system in this regard, and the transparency of Hughes' "analysis" is striking.

(4) Hughes' References to the "Pain that the GSO Would Bear" are Based on Irrelevant Assertions

Hughes asserts that "the 'pain' that LMDS would incur under any of these band plans is essentially the same as the 'pain' that the GSO would bear from a non-contiguous spectrum allocation." (Hughes letter, pp. 2-3). This assertion is misleading in that Hughes places the emphasis on video set-top boxes, when not a single Ka-band proposal contemplates direct broadcast multi-channel video service. Hughes once again is intellectually dishonest, comparing apples to oranges, and Hughes simply would not suffer the "pain" that Option 5 would inflict on LMDS.

The LMDS Rulemaking proceeding has now entered its fourth year without resolution, and the time is long overdue for the Commission to bring this proceeding to a prompt and reasoned conclusion as generally contemplated by the Commission

in its unanimous vote on July 13, 1995 adopting the Third NPRM. The LMDS community is united in its vigorous opposition to Option 5, and Hughes' latest disingenuous analysis simply does not provide a basis in the record for the adoption of Option 5.

LMDS is poised for immediate deployment today through spectrum auctions, yet due to continued delay, the United States now is at serious risk of losing its lead in setting the standard for the global deployment of LMDS, a U.S.-based technology. Just last week, Canada, which began considering this issue well after the United States, concluded its proceeding by announcing that it has designated a total of 3 GHz, from 25.35-28.35 GHz, for LMDS-like Local Multipoint Communications Services, with immediate licensing of 1 GHz from 27.35-28.35 GHz. Ironically, the adoption of an unacceptable band segmentation plan such as Option 5, as well as further delay in this proceeding, will severely stunt the deployment of this U.S.-based technology in the United States, while LMDS thrives in communications marketplaces throughout the world.

Sincerely,

Michael R. Gardner
Charles R. Milkis
Counsel for CellularVision

cc Chairman Reed E. Hundt
Commissioner James H. Quello
Commissioner Andrew C. Barrett
Commissioner Rachelle Chong
Commissioner Susan Ness
Blair Levin
Ruth Milkman
Jackie Chorney
Lauren J. Belvin
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Gregory Rosston
Donald H. Gips
Thomas Tycz
Harry Ng
Karl Kensinger
Jennifer Gilsenan
Michael J. Marcus
William Caton

Certification of Jeffrey A. Krauss, Ph. D.

I, Jeffrey A. Krauss, am the principal of Telecommunications Technology and Policy, a consulting firm. I have contributed to the technical information set forth in this submission by CellularVision. My contribution is the result of my own independent research and analysis. Except for those factual matters of which official notice may be taken or which are matters of public record, I certify that the statements made in the attached paper are true, complete and correct to the best of my knowledge.

Dated: March 6, 1996

Jeffrey A. Krauss

Jeffrey A. Krauss, Ph. D.

Certification of Eric N. Barnhart, P.E.

I, Eric N. Barnhart, currently am a member of the Research Faculty of the Georgia Institute of Technology and Chief of the Communications and Networking Division, Georgia Tech Research Institute. I have contributed to the technical information set forth in this submission by CellularVision. My contribution is the result of my own independent research and analysis and does not represent the views of the Georgia Tech Institute of Technology, which has not expressed an opinion in the 28 GHz Rulemaking proceeding. Except for those factual matters of which official notice may be taken or which are matters of public record, I certify that the statements made in the attached paper are true, complete and correct to the best of my personal knowledge.

Dated: March 6, 1996

Eric N. Barnhart, P.E.